Winter Operations Update

Iowa Freight Advisory Council
December, 2017



Winter Travel Resources

- There are websites that can assist during winter weather
 - 511
 - Track-a-plow
 - Weatherview
- Each features real-time data, camera imagery, and more

lowa 511 http://hb.511ia.org

Winter Road Condition Reports

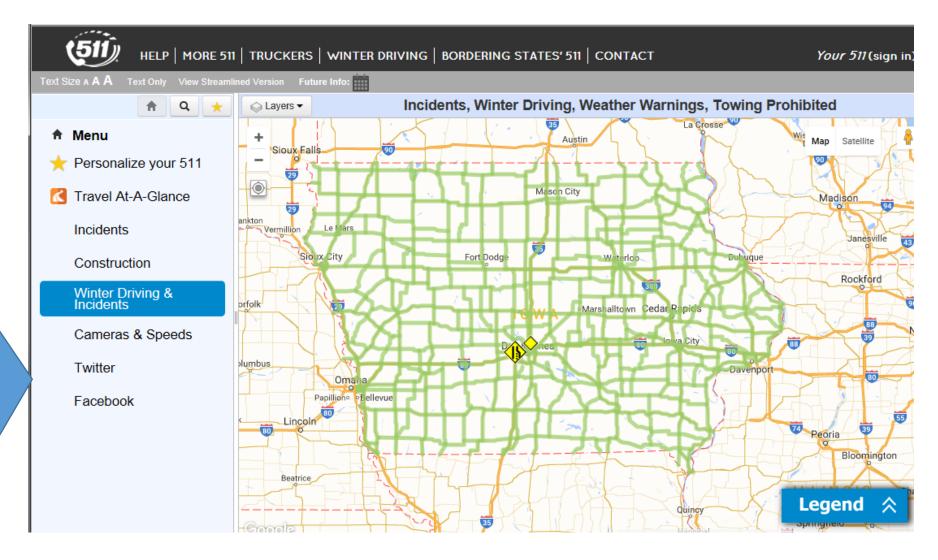
> Roadside Cameras

Traffic Speeds

Road Closures

Towing Bans

WAZE reports

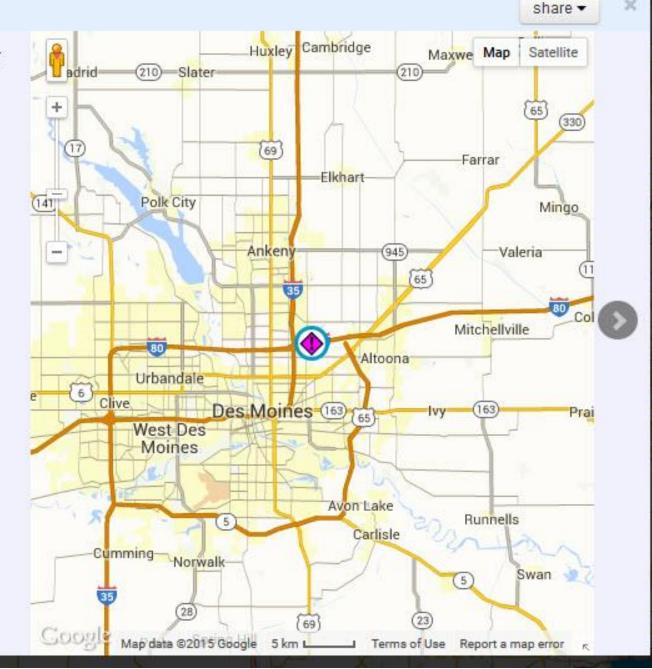




Between Exit 141: US 65 and I-235; I-35 (near Altoona). A Waze user reported a major accident.

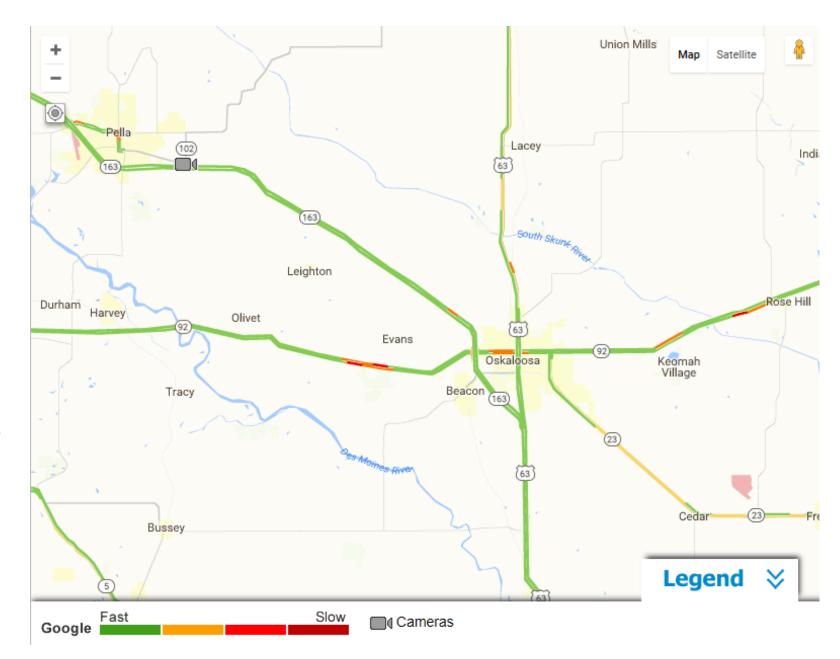
Reported by Waze App Today at 2:00 PM



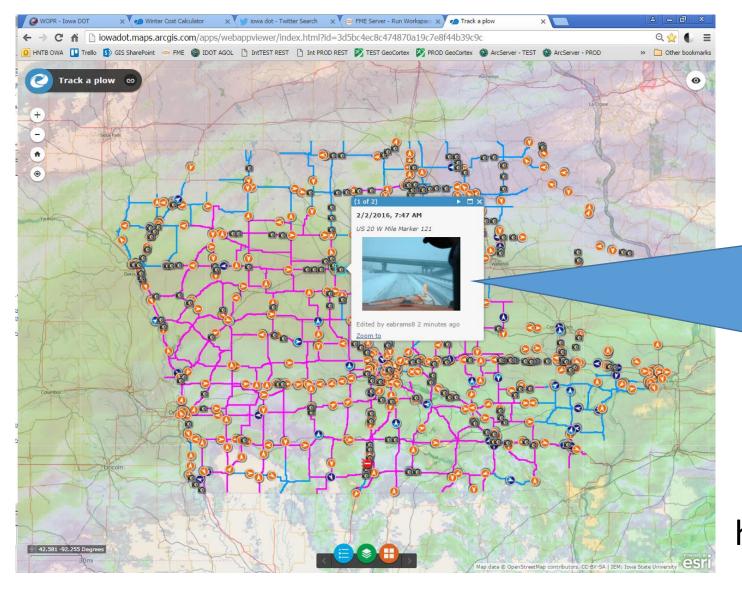


511 Traffic Speed

- We use traffic speed to estimate the impact of weather on drivers
- Drivers tend to slow down:
 - In bad visibility
 - When they think the road feels slick
 - After seeing other cars in the ditch



Track-A-Plow



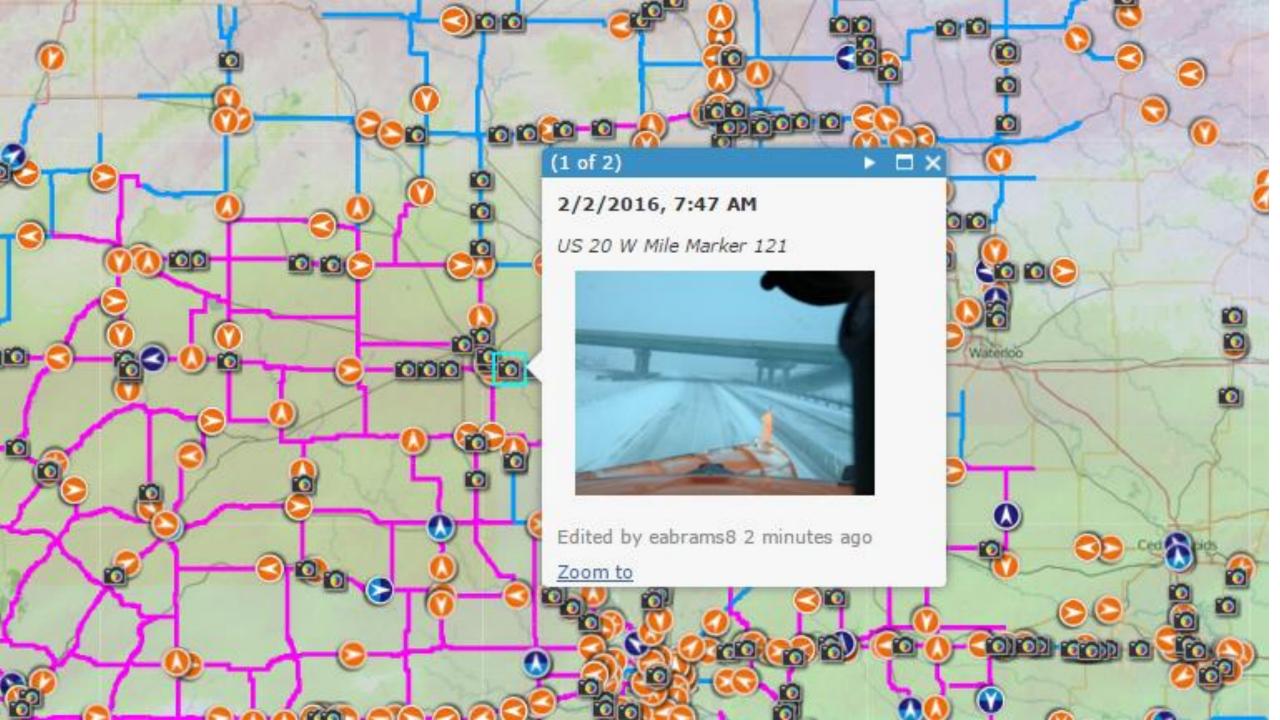
See where plows are – and what we see from the windshield

Color-coded road condition reports

Radar overlay

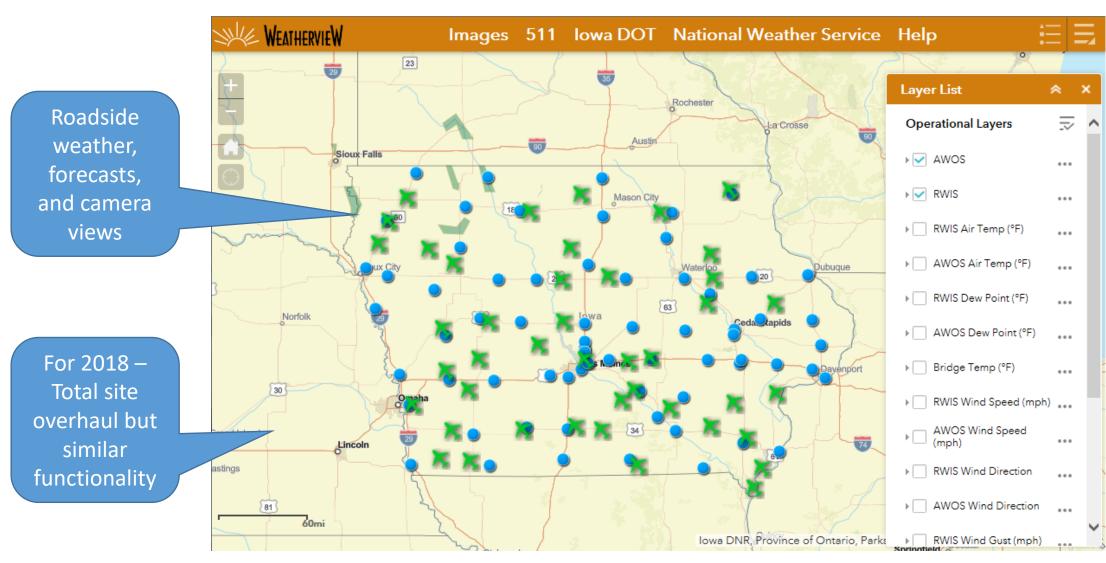
Expect to be up to 600 plow cams by winter (was ~450)

http://trackaplow.iowadot.gov



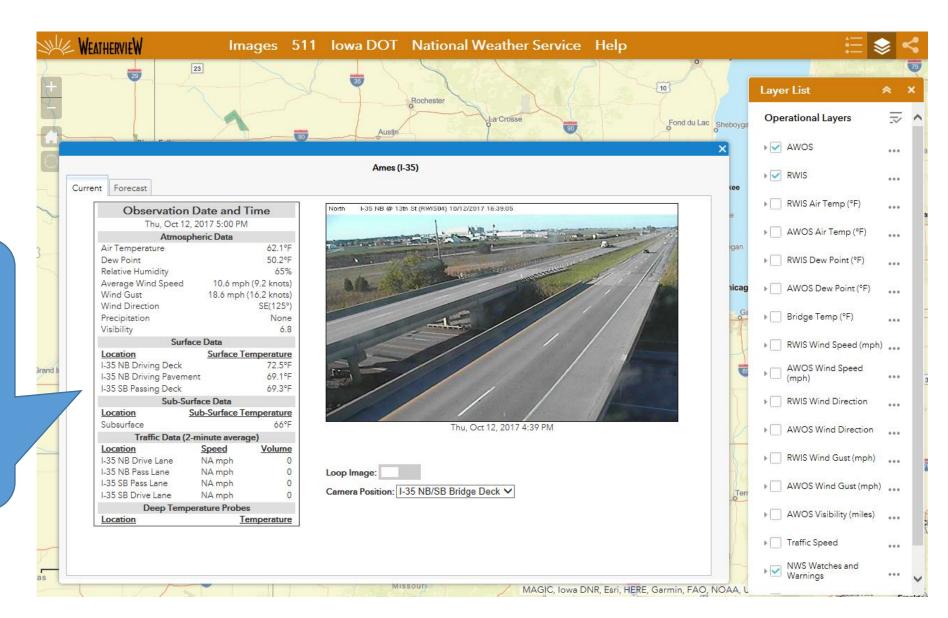


Weatherview



http://weatherview.iowadot.gov

http://weatherview.iowadot.gov



Camera images now available on mobile devices

http://weatherview.iowadot.gov

County Name: WEBSTER V														
Date Time Hour (CST)	Road Temp ♥	Road Frost Prob (%)	Bridge Temp	Bridge Frost ♥	Air Temp ♥	Dew Point ♥	Wind 	Wind Speed (mph)	Wind Gust \$ (mph)	Precip Type ♦	Precip Prop ♦ (%)	Precip Rate \$ (in/hr)	Sky	
October 12 2017, 16:00	72°F	No	72°F	No	60°F	51°F	SSE	13	23	None	0	0	Mostly Cloudy	
October 12 2017, 17:00	69°F	No	69°F	No	59°F	51°F	SSE	12	20	None	0	0	Partly Cloudy	
October 12 2017, 18:00	62°F	No	62°F	No	59°F	51°F	SSE	10	0	None	0	0	Partly Cloudy	
October 12 2017, 19:00	58°F	No	58°F	No	58°F	52°F	SSE	8	0	None	0	0	Partly Cloudy	
October 12 2017, 20:00	56°F	No	56°F	No	56°F	51°F	SSE	7	0	None	0	0	Partly Cloudy	
October 12 2017, 21:00	55°F	No	55°F	No	56°F	51°F	SSE	7	0	None	0	0	Partly Cloudy	
October 12 2017, 22:00	55°F	No	55°F	No	56°F	51°F	SSE	6	0	None	0	0	Partly Cloudy	

A Bit About Iowa DOT Winter Operations

- 102 garages
- ~900 snow plows
- 1,000 winter staff
- 9,480 centerline miles
- 24,200 lane miles
- 121,000 tons of salt/year
- 21,800,000 gal. brine
- 40,000 gal. calcium chloride
- 227,000 ton salt storage capacity
- 20,000 tons sand/year
- 70 roadside weather stations



Deicing Chemicals Used or Tested by Iowa DOT

- Sodium Chloride
- Sodium Chloride brine
- Calcium Chloride (liquid & dry)
- Calcium Magnesium Acetate (CMA)
- Potassium Acetate
- Ice Ban (experimental) with salt brine
- Geomelt with salt brine
- Ice Slicer
- Liquid Corn Salt (LCS)
- Activar
- Geomelt 55
- Mineral Melt
- First Down
- Clear Lane
- All Clear
- Caliber
- AG 100
- Fusion



Chemical Application Rates

 Each chemical has different melting properties at different pavement temperatures

• For salt:

Pavement temperature (F)	One pound of salt can melt:
30	46.3 lbs.
25	14.4 lbs.
20	8.6 lbs.
15	6.3 lbs.
10	4.9 lbs.

Half as effective in only 5° drop

Below 0, salt has little melting capacity

Determining Application Rate

- Rate charts help select appropriate amount for the condition
- Depends on storm characteristics and pavement temperature range

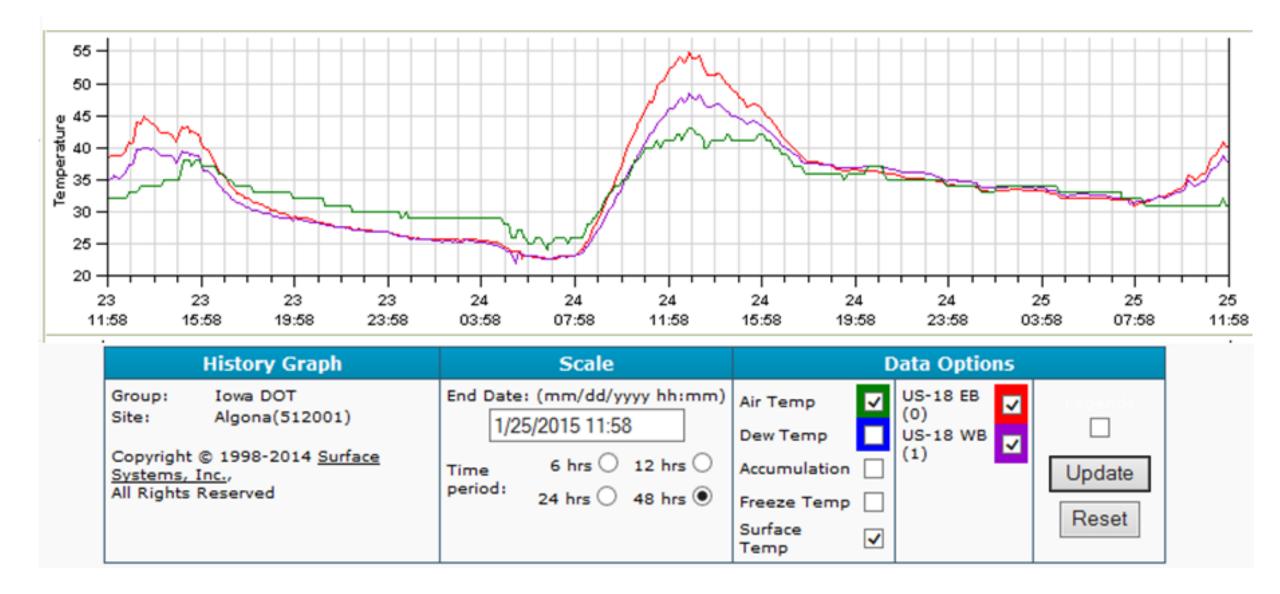
Salt Application Rate Guidelines									
Assuming:	Prewetted salt & 12-foot lane		Hours:	2	Level:	100%			
	Surface Temperature (F):	33-30 F	29-27 F	26-24 F	23-21 F	20-18 F	17-15 F		
Pounds of Salt*	Heavy Frost, Light Snow	50	75	95	120	140	170		
	Medium snow (1/2 inch per hour)	75	100	120	145	165	200		
	Heavy Snow (one inch per hour)	100	140	185	250	300	350***		
	Freezing rain, drizzle, sleet	140	185	250	300	350***	400***		

Rates
scaled up
or down
based on
service
level and
cycle time

Pavement vs. Air Temperature

- Pavement temperature drives:
 - Freezing/melting of road surfaces
 - Thermal energy needed for chemicals to work
- Road, bridge, and air temperature are often quite different!

Pavement vs. Air Temperature



Truckmounted
pavement
temperature
sensor

New Deicer Testing

- "AMP" low temperature brine add-in
- Supposed to work in colder temperatures without hygroscopic characteristics of calcium chloride
- Can also be used as a corrosion inhibitor
- Sioux City, Mason City, Decorah
- ~1,500 gallons at each location

Salt/labor management dashboard



- Produces 'expected' salt/labor use for each area for each day
- Compares 'expected' vs. 'use'



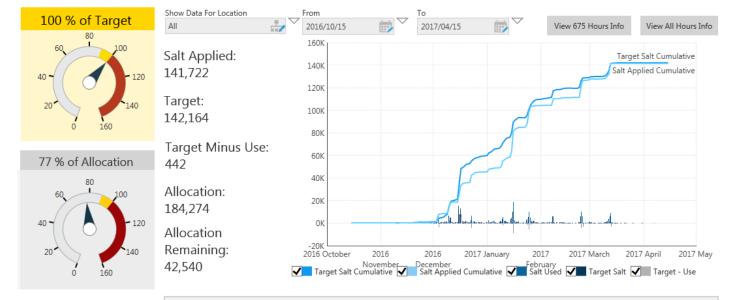
 Shows how well we adhere to our use guidelines for each unique storm and location



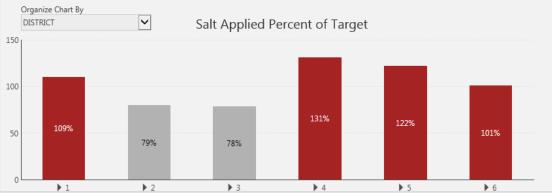
- Uses detailed observed weather data
- Uses each garages' responsibility info. lane miles and service level
- Computes expected use according to guidelines

What Does This Mean For people?

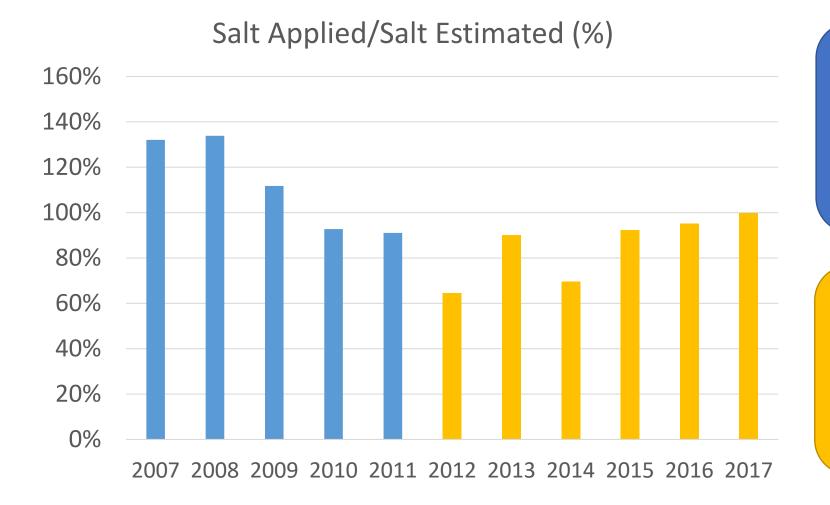
- Targets provide a benchmark
- Visual way to compare
 - Across time or location
 - Outliers become obvious
 - Simple reporting errors
 - Unusual use
- New data daily
 - Catch potential problems early







How We Have Changed



2007-2011 (pre dashboard) value of tons over estimated:

\$1.6 M per year

2012-2017 (after dashboard) value of tons <u>under</u> estimated:

\$1.9M per year

Work Underway with ISU/InTrans

- Winter ops custom heat mapping program
 - Visualize data online with themed maps
 - Where are we putting resources? Are there gaps or unusually high areas?
- Winter ops dashboard
 - Link GPS operations data to traffic speed, crashes, and road condition reports
 - Study how our actions relate to safety and mobility and (hopefully) find patterns to lead us forward
- Plow blade wear evaluation
 - Find the best blade type for the road type
- Plow route optimization
 - Re route plows and assignments based on current garage locations
 - Try some non-traditional routing assignments

Thanks for Listening!

• Tina Greenfield -- Iowa DOT Road Weather Information Systems Coordinator

